

# H-Series

## Thermal Night Vision Camera

### Operator's Manual

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# 1 Introduction

The H-Series handheld thermal imaging camera lets law enforcement officers see clearly in total darkness, giving them the information they need while making quick decisions, enhancing mission effectiveness, maximizing operational capabilities, and improving officer safety.

The H-Series camera provides a  $320 \times 240$  resolution Vanadium Oxide ( $\text{VO}_x$ ) microbolometer giving excellent, high-fidelity thermal imagery with the detail necessary for cutting edge performance. You will see improved detection and recognition ranges in total darkness, as well as through smoke, dust, and light fog.

You can see better through camouflage and foliage in any lighting conditions. Because H-Series cameras see heat, not light, they are not fooled by suspects wearing dark clothes or hiding in bushes.

You can see more—and see farther—than with other night vision technologies because H-Series cameras see clearly without any light whatsoever. You can see farther at night than with technologies that need ambient light to work and you can see heat sources that these other cameras could never find.

With a variety of lens options, on-board image and video capture capability, and optional wireless transmission all built in to the camera, H-Series cameras are the most potent imaging package available today.

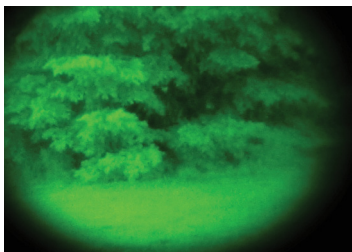


Image Intensified Camera

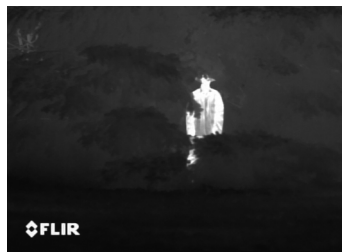


Image with H-Series Camera

## 1 - 1 H-Series Camera Features







- Shuttered Eyepiece—Keeps light from coming out of the viewfinder, helping you stay covert.
- Choose the 19 mm lens with 24° field of view or 2× optical extender.
- Rugged design—Built to withstand the demands of day-in, day-out law enforcement operations. It is even submersible.
- Hot Shoe—Provides convenient power input and video output.
- Two-sided Hand Strap—Accommodates both left-handed and right-handed users.
- SD Card Slot—Allows for field upgrades and storing captured still images and video on the removable SD card.<sup>1</sup>
- USB 2.0 Connection—Rapid transfer of still images and video files from the camera to a PC.<sup>1</sup>
- Four rechargeable AA NiMH batteries—Provides more than 5 hours of camera operation on a single charge.

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1. Available only with the **HS-324 Pro** (Command version).

## 1-2 Detection Range

The illustration below shows the comparative range performance of the H-Series camera with different lens configurations. The data is based on detecting and recognizing a man 1.8 meters tall (and one-half meter wide).

19 mm Lens	 <b>440 m Detection</b>  <b>110 m Recognition</b>
19 mm Lens with 2x Extender	 <b>880 m Detection</b>  <b>220 m Recognition</b>

## 1-3 Cautions

Do not disassemble the camera enclosure. Disassembly can cause permanent damage and will void the warranty. Keep the compartment covers closed to avoid exposing the camera's electronics to water or debris.

It is a good idea to avoid pointing the system directly at extremely high-intensity radiation sources, such as the sun, lasers, arc welders, etc.

Use only the supplied power adapters to power or recharge the camera.

Be careful not to leave fingerprints on the camera's infrared optics.

### Caution!

The camera window has an anti-reflective coating and should only be cleaned with low pressure fresh water and a lens cloth. Improper care of the camera window can cause damage to the anti-reflective coating, degrade the camera's performance, and void the camera warranty.





## 2 Getting Started

The H-Series cameras shown below are available with the features, options, and accessories described in this manual.



19 mm Lens Configuration



19 mm Lens with 2× Extender

## 2-1 Shipping Kits

Refer to the packing list enclosed with your camera shipment to determine the actual contents of your camera package.

- **HS-324 (Patrol version) Camera Package:**

In addition to the camera, Quick Start card, User's manual, and Documentation/Training CD or DVD; the following items are included in the **HS-324** (Patrol version) camera package:



- **HS-324 Pro (Command version) Camera Package:**

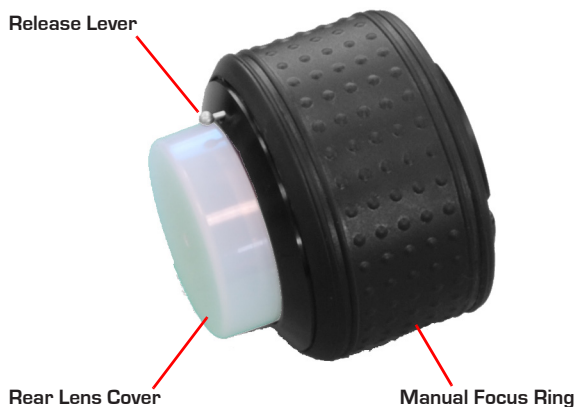
In addition to the camera, Quick Start card, User's manual, and Documentation/Training CD or DVD; the following items are included in the **HS-324 Pro (Command version)** camera package:



## 2-2 Options and Accessories

### 2× Optical Extender for 19 mm lens:

The attachable 2× Optical Extender lens doubles the range of performance when needed, without sacrificing the situational awareness benefits of the wide field of view lens.



## 2-3 H-Series Power Management

Your H-Series camera is equipped with a power management system that provides more than five hours of continuous operation and up to ten days of standby time between battery charges. To make the best use of the camera and to assure it is always ready when you need it, it is important to understand the basic power states of the camera.

The H-Series camera is designed to operate much like your cell phone:

- It is rarely turned off unless you do not plan to use it for a few days or more.
- When near a power source (AC power or a car cigarette lighter) or when not in use, you keep it on a charger.
- When you turn it on from an all the way off condition it takes about 90 seconds to become fully operational.
- In Standby, it is always ready to go. Press the power button and it is on in a second.
- It will automatically put itself in Standby to conserve the battery.

### Power States

- Four power states: Off, On, Bootup, and Standby
- Initial power-on Bootup takes about 90 seconds (fast flashing red state LED next to the display). While in the Bootup state, pressing the Power button again will turn the camera off. After the camera is finished its power-on Bootup, it is in the On state (state LED is off). After the camera is On, pressing the Power button will put the camera into Standby.
- When battery powered, the camera goes to Standby after three minutes if no buttons are pushed. A warning is shown on the display.
- From the Standby state, the camera comes back on within about a second when any button is pushed.
- The Auto-Standby function is disabled if the camera is powered with auxiliary power.

The table below summarizes the four power states an H-Series camera can be in. During most use scenarios the operator will cycle between the Standby and On states. Only at the end of a shift or when not needed on multi-day field missions might you consider putting the camera into the OFF state.

**Note**

A red LED located next to the viewfinder indicates the current state and can only be seen when the shuttered eyepiece is opened (for example, when the camera is held up to the eye).

Camera State	How do you know?
Off	The display and the state LED is off
Power-on Bootup	Color bars on the display and the state LED is flashing quickly
On	There's a thermal image on the display and the state LED is off
Standby	The display is off and the state LED is flashing slowly

Changing between the Off, On, and Standby power states is controlled by the Power button. The table below describes how the camera moves between states.

From State	To State	Method
Off	On	Press the Power button for 1 second. (This will put the camera in the power-on boot process for about 90 seconds before going to the On state.)
On	Standby	Momentarily press the Power button
Standby	On	Momentarily press the Power button
On	Off	Press and hold the Power button for 8 seconds
Standby	Off	Press and hold the Power button for 8 seconds

## 2-4 Installing the Batteries and SD Card

The batteries must be installed and charged before using your camera. If an SD card is included with your camera package, you can also install it at this time.

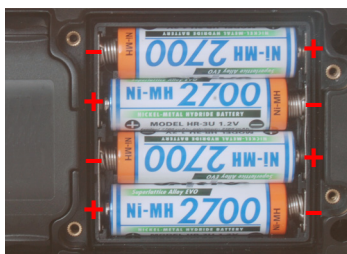
1. Remove the small SD card door. No tools are required.
2. If included with your camera package, install the SD card.



Battery cover



Grasp SD card door edges and pull



3. Loosen the four captive screws securing the battery cover.

4. Pry off the battery cover by grasping the front edge exposed when the SD card cover was removed.

5. Install the batteries as shown.

6. Snap the SD card door back into place, ensuring that the rubber lanyard retracts into the camera.

7. Re-install the battery cover—it only fits one way.
8. Tighten the four screws.

If you have installed rechargeable batteries, they must be charged before using the camera. Regular AA batteries will provide about one and a half hours of camera use.



## 2-5 Charging the Camera

The batteries in the camera must be charged prior to their first use.

1. Connect the Hot Shoe to your camera.



2. Rotate the attachment wheel in the clockwise direction until tight.



3. Plug the power adapter provided with the camera into its power source and also into the Hot Shoe.

The initial charge time is approximately 4 hours.

Only use the auxiliary power adapters provided with your H-Series camera (car adapter or AC adapter).

Connecting the camera to an improper power source may damage the camera and void your warranty.

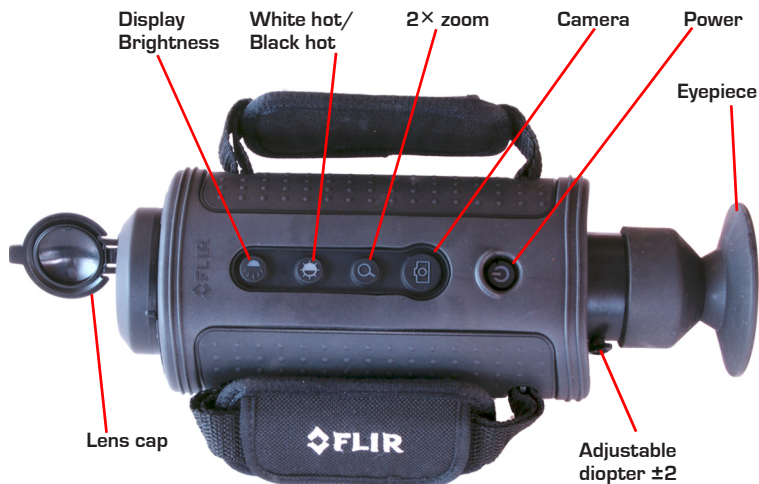
Plug from power adapter



## 3 Operating Your H-Series Camera

### 3-1 Camera Features and Buttons

The following diagram shows the features and buttons on your camera.



**Power Button** – The H-Series Thermal Imager has 3 power modes: On, Off, and Standby.

- On - The first time the Power Button is pressed, the camera will turn on and perform its initial boot up. This takes about 90 seconds.
- Standby - After the camera is on, pressing the Power button will put the camera in the Standby state.
- Off - Push and hold the Power button for eight seconds to turn off the camera.

**Camera Button—HS-324 Pro** (Command version) models only—Use this button to capture snapshots (in JPEG format) or video clips (in MPEG-4 format). The files are stored on the integrated SD card.

- Momentarily pressing the button captures a single snapshot.
- Pressing and holding the button will cause the camera to save a video clip file. The file is written to the SD card when the button is released.

Twenty-five seconds of video requires about one megabyte (MB) of storage on the SD card. The image and video files must be transferred to a computer for viewing.

#### Note

The images must be transferred to a computer via the USB cable, or the SD card can be temporarily removed from the camera and inserted in a card reader.

**Display Brightness Button**—Use this button to cycle through the five levels of display brightness. Each press of the button advances to the next level of brightness. When the highest brightness level is reached, subsequent button presses advance to the next lower brightness levels. When the lowest brightness level is reached, subsequent button presses advance to the next higher brightness levels.

One of the following icons is displayed for approximately 3 seconds after the button is pressed indicating the current brightness level:



**White/Black Hot Button**—Use this button to toggle between the two video options. In the default White Hot mode, hotter objects appear as white or light grey. In the Black Hot mode, hotter objects appear as

black or dark grey. While white hot is the most commonly used and visually intuitive method of viewing thermal imagery, black hot can often enhance contrast of certain objects or provide better visual perspective in some conditions.

When switching between modes, the appropriate icon is displayed for approximately 3 seconds.



**Zoom Button**—Use this button to switch the camera between no zoom (full resolution) and 2× zoom. The central part of the image is magnified twice its normal size when 2× is selected.

**Zoom Indicator**—When zoom has been selected the following icon is continuously displayed on the display:



**Diopter Controls**—The diopter adjustment knob allows a  $\pm 2$  diopter setting range. When the diopter adjustment knob is pointing straight away from the camera, it is in the neutral position.

## 3-2 Batteries

Your H-Series camera is equipped with a sophisticated power system that accommodates a wide variety of AA battery types. This includes rechargeable and non-rechargeable batteries.

The camera is optimized for operation with the 2700 mAh rechargeable NiMh batteries that were supplied with your camera. It is recommended that you use these batteries in all but emergency situations.

### Note

Replacement batteries are available online from FLIR Commercial Vision Systems, Inc.

**Battery Status Indicator**—While the camera is On, a battery status indicator is always displayed in the corner of the viewfinder image. This indicator provides an estimation of the remaining battery charge.



full charge



half charge



no charge

### Note

If non-rechargeable batteries are installed the battery indication may not be accurate.

**Using Non-Rechargeable Batteries**—The H-Series camera allows Alkaline non-rechargeable batteries to be used. When non-rechargeable batteries are installed, connecting the Hot Shoe to a power source will power the camera from the power source and the battery charging circuitry will be disabled.

### Note

When using Alkaline batteries, operating battery life is reduced to approximately 1.5 hours.

**Low Battery Auto-Shutdown**—When the batteries are almost fully depleted the camera will automatically initiate a shutdown process.

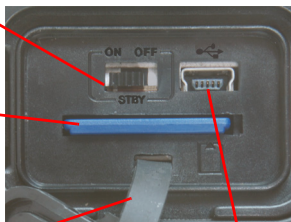
### 3-3 SD Card Door

The SD Card door is located on the bottom of the camera in front of the battery compartment. The SD card, the USB connector, and the Auto-Standby switch are located under the door.

Auto-Standby  
switch

SD Card

Lanyard



USB

SD Card  
door



#### Note

The Hot Shoe must be removed to access the SD Card door.

To open the SD Card door, grasp the two edges with your thumb and finger and pull straight up.

#### Caution!

Do not stretch or break the rubber lanyard that keeps the door captive to the camera when opened.

To close the SD Card door, slide the lanyard strap back into the camera, position the door in place, and then firmly press in the middle of the door until it is fully seated.



Grasp SD Card door  
edges and pull

## SD Card Capacity and Type

The **HS-324 Pro** (Command version) model camera supports standard 1Gb, 2Gb, and 4Gb SD cards that are compliant with the SD 1.0 and 1.1 specification.

H-Series cameras are not compatible with SDHC standards.

If an SD card is inserted into an **HS-324** (Patrol version) model, it will be ignored. The **HS-324** (Patrol version) model must be upgraded to an **HS-324 Pro** (Command version) model for the SD card to operate.

To remove the SD card, press on the SD card until its edge is nearly flush with the surface and release.

To insert an SD card, use this same motion.



## 3-4 Auto-Standby Operation

Auto-Standby is a feature of the H-Series camera that helps to guard against draining the batteries prematurely by inadvertently leaving the camera on. Auto-Standby puts the camera into the Standby state if the following three conditions are met:

- The camera is in the On state.
- The Auto-Standby switch (STBY) is set to ON. See "Auto-Standby Switch."
- No buttons have been pressed for three minutes.

Once these conditions are met you will see the following message on the display and the camera will enter the Standby state after the countdown is finished:

**Auto-Standby in  
30 Seconds**

**Hit Any Button To Abort**

Press any button during this countdown to terminate Auto-Standby and resume normal operation.

### Note

Pressing any button during an Auto-Standby countdown will only terminate the countdown and abort the Auto-Standby. The normal function of the button will not occur.

### Auto-Standby Switch

Some use scenarios involving unattended operation of the camera may require disabling Auto-Standby.

Select OFF to turn off Auto-Standby.

Select ON to turn on Auto-Standby.



**Auto-  
Standby  
Disabled**

If Auto-Standby is off, a reminder message will appear in the viewfinder each time the camera enters the On state.



## 3-5 Shutdown Process

To shut the camera completely off requires holding the Power button for 8 seconds.

After holding the Power button for 3 seconds the following message will be displayed in the viewfinder and the camera will enter the OFF state if the countdown finishes:



**Shutdown in  
5 Seconds**

Release the Power button at any time during this countdown to terminate Shutdown and resume normal operation.

### Note

If the camera is in the Standby state and the Power button is held down for 8 seconds, the camera will shutdown without warning.

## 3-6 The Hot Shoe

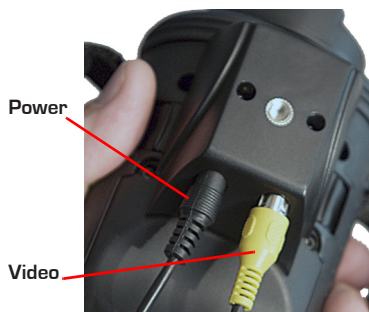
### Note

The Hot Shoe is not waterproof and should not be used in wet environments.

The Hot Shoe provides the connections to charge the camera batteries and to access the analog video output. The Hot Shoe attaches to the bottom of the camera and is secured via the tripod mount.

The following steps are recommended for quick and easy attachment of the Hot Shoe.

1. With the camera positioned bottom-side up, hold the Hot Shoe in position.
2. Rotate the attachment wheel in the clockwise direction until tight.
3. To remove the Hot Shoe, simply rotate the attachment wheel in the counter-clockwise direction until it is free.



## 3-7 Bayonet Lens Mounting System

The H-Series camera is equipped with a robust bayonet mounting system to allow for field-interchangeable optics options and future accessories. As shipped, the HS-324 comes with a lens-cover assembly mounted on the bayonet mount.

## 3-8 Operation of the lens-cover assembly

The lens cover is a simple flip-to-open lens cover that provides protection for the camera lens when not in use. To open, simply flip the lens cover down to the fully open position (45° pointing toward the ground as shown in the photograph at the right).



To remove the lens-cover assembly, rotate the outer ring of the lens cover clockwise so that the index mark on the top of the lens cover aligns with the index mark on the front body of the camera (approximately 45°), and pull straight off.



## 3-9 2× Extender

The 2× Optical Extender, compatible with the HS-324 camera, provides the user the ability to see twice as far and/or enhance the resolution of objects in the field of view by a factor of two. The 2× Optical Extender is mounted on the bayonet mount in front of the existing lens on the camera.

To mount the 2× extender, first remove the lens cover assembly. Then, position the 2× extender so that the release lever on the 2× extender is in the 5 o'clock position on the bayonet mount. Firmly push the extender onto the bayonet mount, then rotate the lens counter-clockwise so that the release lever reaches the 3 o'clock position where it will hit a hard stop.



Release Lever

### Note

The 2× extender is manually focused by rotating the outer rubber-coated ring.

To remove the 2× extender, press the release lever and rotate the extender clockwise until the release lever is roughly at the 5 o'clock position and pull straight off.

### Caution!

Be sure to replace the lens cover assembly when the 2× Extender is not in use to avoid moisture, dust, or other contaminants reaching the inner lens surface of the 2× Extender.

## 3 – 10 Storage Functions: HS-324 Pro (Command version)

The **HS-324 Pro** (Command version) model has the ability to capture and store still or video imagery. All imagery is stored on the SD card located under the SD Card Door on the bottom of the unit.

- If the camera is not an **HS-324 Pro** (Command version) model, this message will be displayed.
- If an SD card is not installed, this message will be displayed and no image will be stored.
- If the SD card is full, a warning will be displayed and the image will not be stored.

**Feature  
Not Enabled**

**SD Card  
Not Installed**

### Note

The stored image will include the thermal image, time and date information, and the FLIR logo. Other icons seen through the viewfinder are not stored on the saved image.

## Still Frame Capture and Store

To capture and store a single still image of what is currently being displayed in the viewfinder, momentarily press the Camera button. The thermal image will momentarily freeze and the following icons will be displayed in the viewfinder:



The SD Card Memory Gauge indicates how much memory is left on the SD card. The camera icon with the green lens indicates that a single frame was successfully stored to the SD card. Still images are stored in the JPEG file format at 320 × 240 pixel resolution. Still images are approximately 90Kb in size.

## Video Capture and Store

To capture and store a video sequence of what is currently being displayed in the viewfinder, press and hold the Camera button. Video capture will begin immediately and continue until the Camera button is released.

During the video store process, real-time video will be displayed and these icons will appear in the viewfinder:



The lens on the camera icon will flash red/green during recording.



Video is stored in an MPEG-4 format at approximately 8 seconds per megabyte.

## 3-11 Hand Position

The H-Series camera is designed for use in a wide variety of applications and environments and by a wide range of users. Individual preference and lens configuration will determine the most comfortable hand position. Positions are interchangeable between left- and right-handed users.

The Base position is the most common hand position for an HS-324 camera used without a 2× extender. These configurations have less weight in the front of the unit and the center-of-gravity is roughly centered on the unit.

In the Base position, the index finger is comfortably positioned over the POWER button as shown in Figure 3-1. Middle, ring, and little fingers naturally fall on the Camera, 2×, and WH/BH buttons respectively. The less-often used Display Brightness button is easily reached with the little finger when needed.



Figure 3-1. Base Hand Position

The Forward hand position is often used to compensate for the heavier optical systems found on HS-324 equipped with a 2× extender. In these cases shifting the hand position forward so that the index finger falls on the Camera button helps to compensate for a more forward center-of-gravity of the camera as shown in Figure 3-2.



Figure 3-2. Forward Hand Position

Of course, hand position is purely an individual user preference.

## 4 Technical Data

### 4-1 H-Series Camera Model Features

<b>HS-324 (Patrol version)</b>	H-Series Handheld Thermal Camera (with choice of lens), Hot Shoe Charging & Video Output Attachment, 4 Rechargeable AA Batteries, AC Power Adapter/Charger, Car Adapter/Charger, Neck Lanyard, Manual, USB Cable, Video Output Cable
<b>HS-324 Pro (Command version)</b>	Everything in (Patrol version) Model, plus Tactical Carrying Pouch, image save function, video save function with real-time stamp, USB2 port enabled

Start up from stand-by	<1.5 seconds
Thermal Sensitivity, Waveband	<50 mK @ f/1.0, 7.5 - 13.5 $\mu$ m
Detector Type	320 × 240 VOx Microbolometer
Image Processing	FLIR Proprietary Digital Detail Enhancement
Focus, Zoom	Fixed, 2× electronic zoom
Video Output	NTSC or PAL composite video; RCA jack



## 4-2 Power

Battery Types	4 AA Batteries; NiMH or Alkaline
Battery Life Operating (Stand-By)	>5 Hours on NiMH batteries, [120 hours on NiMH batteries]

## 4-3 Environmental

Ratings	IP-67, Submersible, 1 meter drop
Operational Temp.	-4°F - 140°F [-20°C - 60°C]

## 4-4 Physical

Weight (incl. lens)	1.45 lb. [653 g] with batteries; add 0.7 lb. [315 g] for 2× extender
Size (L × W × H)	10.42" × 3.33" × 2.62" [256 × 84.5 × 66.5 mm]

## 4-5 Lens Choice

	<b>HS-324</b>
FOV	24° × 18°
FOV (w/Optional 2× Extender)	12° × 9°

## 4-6 Additional Features: HS-324 Pro (Command version)

Still Image Storage, Format	SD card, JPEG; 320 × 240 resolution
Video Storage, Format	Approx. 8 seconds/Mb on SD card, 320 × 240 MPEG-4

## 4-7 Range Detection<sup>1</sup>

	HS-324/with 2× Optical Extender
Detect Man (1.8 m × 0.5 m)	1,445' (440 m)/2,890' (880 m)
Recognize Man	360' (110 m)/720' (220 m)
Detect Vehicle (2.3 m × 2.3 m)	4,070' (1240 m)/8,140' (2480 m)
Recognize Vehicle	1,050' (320 m)/2,100' (640 m)

- 
1. Actual range may vary depending on camera set-up, environmental conditions, and user experience.







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